

# Salmonellosis (Non-Typhoid *Salmonella* spp.)

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*Note:* This chapter focuses on salmonellosis that is not typhoid. For information about typhoid fever (salmonellosis caused by *Salmonella typhi*) refer to the chapter entitled “Typhoid Fever.”

## 1) THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic Agent

Salmonellosis refers to disease caused by any serotype of bacteria in the genus *Salmonella* other than *Salmonella typhi* (the *Salmonella* species which causes typhoid fever).

The way *Salmonella* bacteria are named has evolved considerably in recent years. A new classification for *Salmonella* has been proposed based on DNA relatedness. This new nomenclature recognizes only two species: *Salmonella bongori* and *Salmonella enterica* (all human pathogens are regarded as serovars within the subspecies of *S. enterica*). For example, the proposed nomenclature would change *S. typhi* to *S. enterica* serovar Typhi, abbreviated **S. Typhi**, and *Salmonella enterica* serovar Enteritidis would be referred to as **S. Enteritidis** instead of *S. enteritidis*.

### B. Clinical Description and Laboratory Diagnosis

The most common symptoms of salmonellosis are diarrhea (sometimes bloody), stomach cramps, fever, nausea, and sometimes vomiting. Dehydration may be severe, especially among infants and the elderly, and invasive disease may occur. The infection may also present as septicemia, an abscess, arthritis or cholecystitis.

Laboratory diagnosis is based on isolation of organism from feces and blood during the acute stage of infection and from feces for several days weeks after the acute phase or during asymptomatic infections.

### C. Reservoirs

*Salmonella* bacteria are widely distributed in the animal kingdom, and can infect livestock, pets, poultry and other birds, reptiles and amphibians. Most infected animals are chronic carriers. Humans can also be sources of infection.

### D. Modes of Transmission

*Salmonella* is transmitted via the fecal-oral route. The most common mode of transmission is ingestion of food or water that has been contaminated with human or animal feces. This includes raw or undercooked poultry, eggs and egg products, undercooked meats, and raw milk or milk products. However, any food contaminated with the bacteria can be a source of infection. For example, outbreaks have been traced to the consumption of raw fruits and vegetables contaminated during slicing. A large dose of organisms is usually needed to cause infection, but the infectious dose may be lower for certain susceptible groups such as children, the elderly and the immunocompromised. In addition, reptiles such as iguanas and lizards are chronic carriers of these bacteria and can be sources of infection. Fecal-oral transmission from person-to-person is important (particularly when diarrhea is present) especially among household contacts, preschool children in daycare, and the elderly and developmentally disabled living in residential facilities. Transmission can also occur through certain types of sexual contact (e.g., oral-anal contact).

### E. Incubation Period

The incubation period can vary from 6 to 72 hours but is usually about 12 to 36 hours, although incubation periods longer than 3 days have been documented.

#### **F. Period of Communicability or Infectious Period**

The disease is communicable for as long as infected persons excrete *Salmonella* bacteria in their stool. This can last from days to months, depending on the serotype but rarely lasts more than one year. Treatment with antibiotics can prolong carriage.

#### **G. Epidemiology**

Salmonellosis has a worldwide distribution, with approximately 5 million cases occurring annually in the United States alone. About 60–80% of cases are sporadic, but large outbreaks have occurred in institutional settings and nationwide from common food sources. The largest common vehicle outbreak of salmonellosis ever recognized in the United States was caused by ice cream made from premix that had been transported in contaminated tanker trucks. In New Jersey, approximately 1,600 cases of salmonellosis are reported annually to the New Jersey Department of Health and Senior Services (NJDHSS).

## **2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES**

### **A. NJDHSS Case Definition**

#### **CASE CLASSIFICATION**

##### **A. CONFIRMED**

Isolation of *Salmonella* from a clinical specimen, regardless of symptoms.

##### **B. PROBABLE**

A clinically compatible case that is epidemiologically linked to a confirmed case.

##### **C. POSSIBLE**

Not used.

**NOTE: Isolates of *Salmonella* must be submitted within the three (3) working days to the New Jersey Department of Health and Senior Services, Division of Public Health and Environmental Laboratories, Specimen Receiving and Records, P.O. Box 361, John Fitch Plaza, Trenton, NJ 08625-0361.**

### **B. Laboratory Testing Services Available**

The NJDHSS Public Health and Environmental Laboratories (PHEL) will test stool specimens for the presence of *Salmonella* and will also confirm and serotype isolates of *Salmonella* obtained from clinical specimens at other laboratories. **The PHEL requests that all laboratories submit within three (3) days all isolates of *Salmonella* for typing to aid in public health surveillance (N.J.A.C. 8:57-1.6 (f)) to the NJDHSS, PHEL (see above Note).** For more information contact the PHEL at 609.292.7368.

## **3) DISEASE REPORTING AND CASE INVESTIGATION**

### **A. Purpose of Surveillance and Reporting**

- To identify whether a case may be a source of infection for other persons (*e.g.*, a diapered child, daycare attendee or foodhandler) and, if so, to prevent further transmission.
- To identify transmission sources of public health concern (*e.g.*, a restaurant or a commercially distributed food product) and to stop transmission from such sources.

### **B. Laboratory and Healthcare Provider Reporting Requirements**

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that health care providers and laboratories report (by telephone, confidential fax, over the Internet using the Communicable Disease Reporting System [CDRS] or in writing) all cases of salmonellosis to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the health care provider requesting the laboratory examination is located.

## **C. Local Board of Health Reporting and Follow-Up Responsibilities**

### **1. Reporting Requirements**

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that each local health officer must report the occurrence of any case of salmonellosis, as defined by the reporting criteria in Section 2 A above using the [CDS-1](#) form. A report can be filed electronically over the Internet using the confidential and secure Communicable Disease Reporting System (CDRS).

### **2. Case Investigation**

- a. It is the health officer's responsibility to investigate the case by interviewing the patient and others who may be able to provide pertinent information. Much of the information can be obtained from the patient's healthcare provider or the medical record.
- b. Use the following guidelines to complete the form:
  - 1) Accurately record the demographic information, date of symptom onset, symptoms, and medical information.
  - 2) When asking about exposure history (food, travel, activities, etc.), use the incubation period for salmonellosis (6–72 hours). Specifically, focus on the period beginning a minimum of 6 hours prior to the case-patient's onset back to no more than 72 hours before onset. If possible, record any restaurants at which the case-patient ate, including food item(s) and date consumed.
  - 3) Ask questions about travel history and outdoor activities to help identify where the case-patient became infected.
  - 4) Ask questions about water supply (salmonellosis may be acquired through water consumption).
  - 5) Ask questions about household/close contact, pet or other animal contact. Ask specifically about exposure to reptiles.
  - 6) Ask questions about travel history and outdoor activities to help identify where the case-patient became infected.
  - 7) Determine whether the case-patient attends or works at a daycare facility and/or is a foodhandler.
  - 8) In a case of an outbreak, notify the NJDHSS Infectious and Zoonotic Diseases Program by telephone at 609.588.7500 during business hours, and at 609.392.2020 after business hours, on weekends, and holidays.
  - 9) If there have been several attempts to obtain patient information (*e.g.*, the patient or healthcare provider does not return calls or does not respond to a letter, or the patient refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as possible. Please note on the form the reason why it could not be filled out completely.
  - 10) **If CDRS is used to report the case, the information can be recorded in the "Comments" section.**

After completing the form, it should be mailed (in an envelope marked "Confidential") to the NJDHSS Infectious and Zoonotic Diseases Program, or the report can be filed electronically over the Internet using the confidential and secure CDRS. The mailing address is:

NJDHSS  
Division of Epidemiology, Environmental and Occupational Health  
Infectious and Zoonotic Diseases Program  
P.O.Box 369  
Trenton, NJ 08625-0369

- c. Institution of disease control measures is an integral part of case investigation. It is the local health officer's responsibility to understand, and, if necessary, to institute the control guidelines listed below in Section 4, "Controlling Further Spread."

## 4) CONTROLLING FURTHER SPREAD

### A. Isolation and Quarantine Requirements (N.J.A.C. 8:57-1.12)

Foodhandlers with salmonellosis must be excluded from work.

*Note:* A case of salmonellosis is defined by the reporting criteria in Section 2 A of this chapter.

#### Minimum Period of Isolation of Patient

After diarrhea has resolved, foodhandlers may only return to work after producing **two (2)** negative stool specimens collected not less than 24 hours apart. If the case-patient has been treated with an antimicrobial, the stool specimens shall not be submitted until at least 48 hours after cessation of therapy.

#### Controlling outbreak

In suspected salmonella outbreaks, all foodhandlers who prepared the suspected or implicated meal/food should be cultured. Personnel who have or who had symptoms or vomiting or diarrhea at the time the suspected food was prepared should be excluded from work immediately. Other foodhandlers who deny illness should be excluded only if they do not submit a stool specimen in a timely manner (usually by next business day). Asymptomatic foodhandlers should be excluded with direct foodhandling responsibilities from such work until they have at least **two (2)** consecutive negative stools collected not less than 24 hours apart. Consideration may be given to allowing such asymptomatic infected food handlers to engage in activities at the food establishment, which do not involve direct foodhandling. The NJDHSS Infectious and Zoonotic Program should be consulted in situations where the course of action is unclear.

#### Minimum Period of Quarantine of Contacts

Contacts with diarrhea who are foodhandlers shall be considered the same as a case and handled in the same fashion. No restrictions are needed otherwise.

*Note:* A foodhandler is any person directly preparing or handling food. This can include a patient care or child care provider.

### B. Protection of Contacts of a Case

None.

### C. Managing Special Situations

#### Daycare

Since salmonellosis may be transmitted person-to-person through fecal-oral transmission, it is important to carefully follow up on cases of salmonellosis in a daycare setting. General recommendations include:

- Symptomatic diapered children should be excluded from daycare facility until there are **two (2)** consecutive negative stools taken at least 24 hours apart.
- Older children with *Salmonella* infection who have diarrhea should be excluded from daycare facility until their diarrhea has resolved.
- Children with *Salmonella* infection who have no diarrhea and are not otherwise ill may remain in the program if special precautions are taken.
- Since most staff in child care programs are considered foodhandlers, those with *Salmonella* in their stools (symptomatic or not) can remain on site, but must not prepare food or feed children until their diarrhea has resolved and they have **two (2)** negative stool tests collected not less than 24 hours apart (if antibiotics were given, follow up stools must be submitted at least 48 hours after completion of antibiotic therapy).

### School

Since salmonellosis may be transmitted person-to-person through fecal-oral transmission, it is important to follow up on cases of salmonellosis in a school setting carefully. General recommendations include:

- Students or staff with *Salmonella* infection who have diarrhea should be excluded until their diarrhea is gone.
- Students or staff with *Salmonella* who do not handle food, have no diarrhea or mild diarrhea, and are not otherwise sick may remain in school if special precautions are taken.
- Students or staff who handle food and have a *Salmonella* infection (symptomatic or not) must not prepare food until their diarrhea resolves and they have **two (2)** negative stool tests (submitted at least 48 hours after completion of antibiotic therapy, if antibiotics were given).

### Community Residential Programs

Actions taken in response to a case of salmonellosis in a community residential program will depend on the type of program and the level of functioning of the residents. In addition to reporting the outbreak to the local health department, facility management should also report any such outbreak immediately to the Division of Long-Term Care (LTC) Compliance and Surveillance Program of the Department of Health and Senior Services by phone at 1.800.792.9770 or fax at 609.633.9060. Written reports should be mailed within 72 hours to NJDHSS, LTC Compliance and Surveillance Program, P.O. Box 367, Trenton, NJ 08625. The NJDHSS considers an event to be an “outbreak” if three (3) cases of similar symptoms occur within a 48 – hour period, or the infectious disease affects 10% of the population, either on one floor, a unit or total capacity of the facility.

In long-term care facilities, residents with salmonellosis should be placed on standard (including enteric) precautions until their symptoms subside *and* they test negative for *Salmonella*. Staff members who give direct patient care (*e.g.*, feed patients, give mouth or denture care, or give medications) are considered foodhandlers and are subject to foodhandler restrictions, (see Section 4 A above). In addition, staff members with *Salmonella* infection who are not foodhandlers should not work until their diarrhea has resolved.

In residential facilities for the developmentally disabled, staff and clients with salmonellosis must refrain from handling or preparing food for other residents until their diarrhea has resolved and they have **two (2)** negative stool tests for *Salmonella* (submitted at least 48 hours after completion of antibiotic therapy, if antibiotics are given). In addition, staff members with *Salmonella* infection who are not foodhandlers should not work until their diarrhea has resolved.

### Reported Incidence Is Higher than Usual/Outbreak Suspected

If the number of reported cases of *Salmonella* in a city/town is higher than usual, or if an outbreak is suspected, investigate to determine the source of infection and mode of transmission. A common vehicle (such as water, food or association with a daycare center) should be sought and applicable preventive or control measures should be instituted. If food is suspected as a source of infection, use the [Patient Food History Listing](#), [Patient Symptoms Line Listing \(Gastrointestinal infection\)](#) and [Food-Specific Attack Rate Table Worksheet](#) to facilitate recording additional information. Control of person-to-person transmission requires special emphasis on personal cleanliness and sanitary disposal of feces. Consult with the NJDHSS Infectious and Zoonotic Diseases Program. The Program staff can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several jurisdictions and therefore be difficult to identify at a local level.

## D. Preventive Measures

### Environmental Measures

Implicated food items must be removed from the environment. A decision about testing implicated food items can be made in consultation with the Infectious and Zoonotic Diseases Program and the Food and Drug Safety Program (FDSP). The FDSP can help coordinate pickup and testing of food samples. If a commercial product is suspected, the FDSP will coordinate follow-up with relevant outside agencies (e.g., FDA, USDA). The FDSP may be reached at 609.588.3123.

*Note:* The role of the FDSP is to provide policy and technical assistance with the environmental investigation such as interpreting the New Jersey Food Code, conducting a hazardous analysis and critical control point (HACCP) risk assessment, initiating enforcement actions and collecting food samples.

The general policy of the PHEL is only to test food samples implicated in suspected outbreaks, not in single cases (except when botulism is suspected). The health officer may suggest that the holders of food implicated in single case incidents locate a private laboratory that will test food or store the food in their freezer for a period of time in case additional reports are received. However, a single, confirmed case with leftover food consumed within the incubation period may be considered for testing.

### Personal Preventive Measures/Education

To avoid future exposures, recommend that individuals:

- Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet, after changing diapers, and after touching their pets or other animals (especially reptiles).
- After changing diapers, wash the child's hands as well as their own.
- In a daycare setting, dispose of feces in a sanitary manner.
- Keep food that will be eaten raw, such as vegetables, from becoming contaminated by animal-derived food products.
- Avoid letting infants or young children touch reptiles, such as turtles or iguanas, or their cages.
- If elderly or immunocompromised, avoid reptiles when choosing pets.
- In a daycare facility or school, do not use reptiles as classroom pets.
- Make sure to thoroughly cook all food products from animals, especially poultry and eggs, and avoid consuming raw or cracked eggs, unpasteurized milk, or other unpasteurized dairy products.
- Avoid sexual practices that may permit fecal-oral transmission. Latex barrier protection should be emphasized as a way to prevent the spread of salmonellosis to sexual partners as well as to prevent the exposure to and transmission of other pathogens.

## ADDITIONAL INFORMATION

A [Salmonellosis Fact Sheet](http://www.state.nj.us/health) can be obtained at the NJDHSS website at <www.state.nj.us/health>. Click on the "Topics A to Z" link and scroll down to the subject *Salmonellosis*.

The Centers for Disease Control and Prevention (CDC) surveillance case definition for salmonellosis is the same as the criteria outlined in Section 2 A of this chapter. CDC case definitions are used by state health departments and CDC to maintain uniform standards for national reporting. For reporting to the NJDHSS, always refer to the criteria in Section 2 A.

## REFERENCES

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